

Utah Division of Air Quality

Western Wildfire Smoke Exceptional Events August 6 – 7, 2017

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Introduction

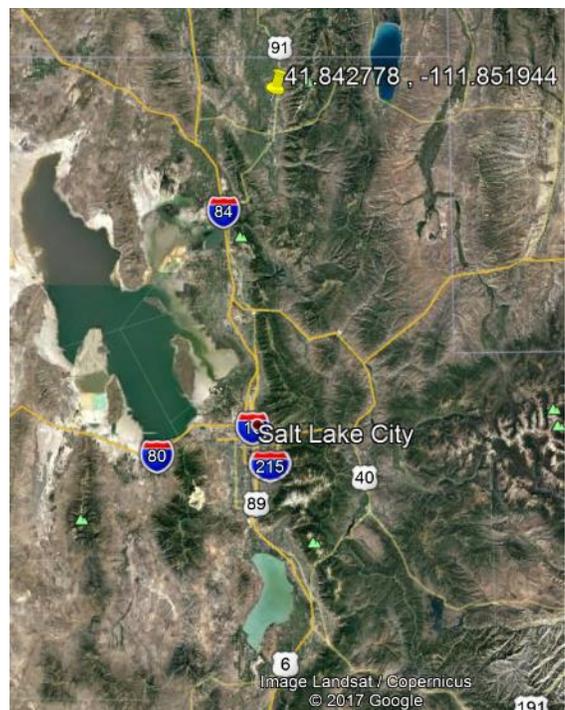
The Code of Federal Regulations (40 CFR 50.14) states that “a State...may request the Administrator (Environmental Protection Agency) to exclude data showing exceedances or violations of any national ambient air quality standard that are directly due to an exceptional event...by demonstrating to the Administrator's satisfaction that such event caused a specific air pollution concentration at a particular air quality monitoring location.” An exceptional event means an event that affects air quality, is not reasonably controllable or preventable, or a natural event, such as a wildfire.

The demonstration to justify data exclusion, as outlined in 40 CFR 50.14, specifies that the following evidence must be provided:

1. A narrative conceptual model that describes the event;
2. There is a clear causal relationship between the measurements under consideration and the event that is claimed to have affected air quality in the area;
3. Analyses comparing the claimed event influenced concentrations to concentrations at the same monitoring site at other times;
4. A state must take appropriate and reasonable actions to protect public health from exceedances or violations of the national ambient air quality standards by developing and implementing a mitigation plan for recurring events and;
5. The Event documentation must be made available for a 30-day public comment period.

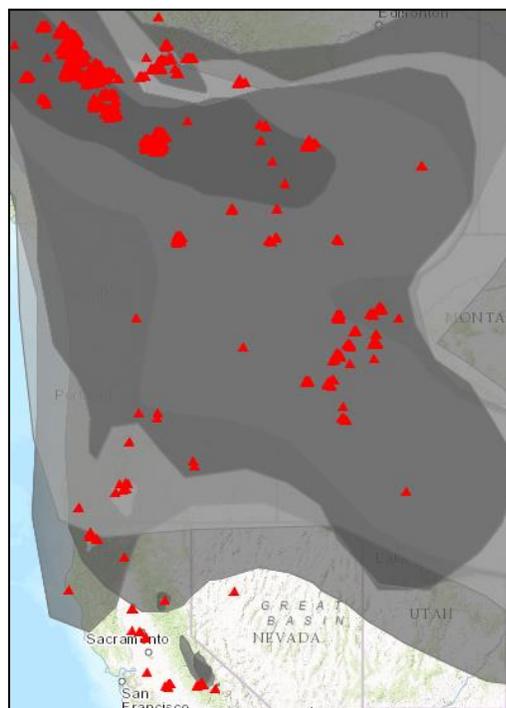
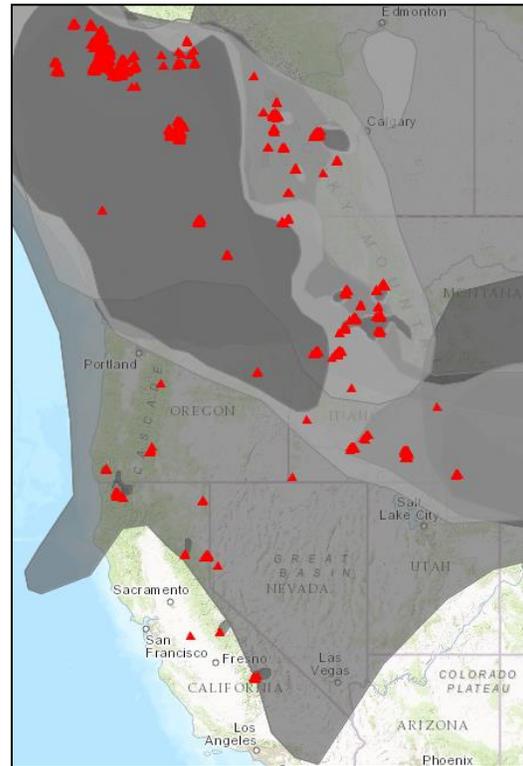
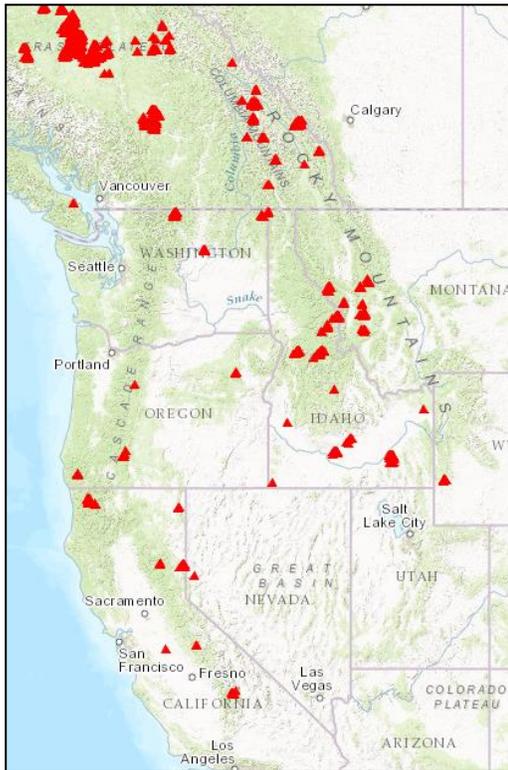
This documentation is being submitted to EPA in order to exclude PM_{2.5} exceedances of the 24-hour standard of 35 µg/m³ at the Smithfield monitoring station (shown as the yellow push pin on the map).due to smoke from western wildfires. The exceedances were:

August 6: 40.6 µg/m³
August 7: 39.6 µg/m³



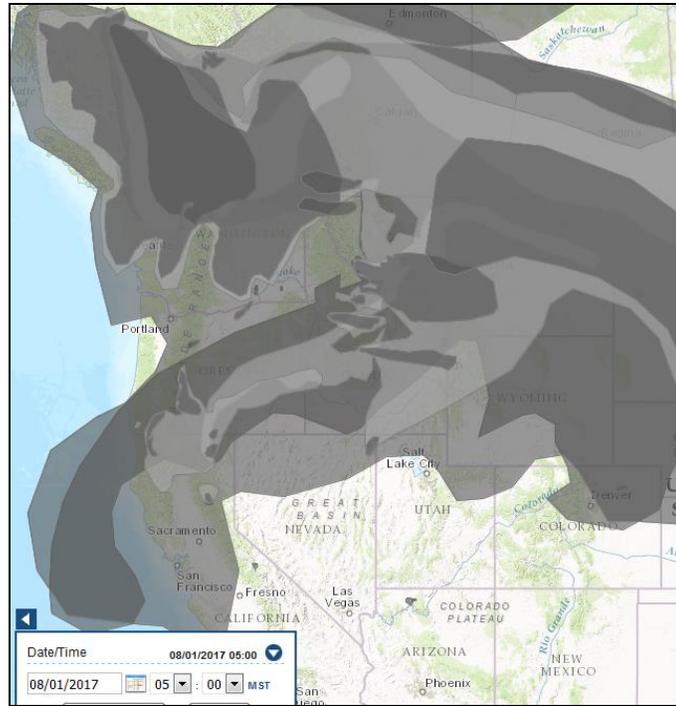
Conceptual Model

Smoke from wildfires across the west was transported to Utah on August 6 and 7, 2017 that resulted in exceedances of the PM_{2.5} 24-hour standard at the Smithfield station. The figure to the upper left shows the locations of the major western fires burning on August 6 and 7. The figure to the upper right shows the EPA smoke map projection for August 6, 2017 and bottom figure shows EPA's smoke projections for August 7, 2017.

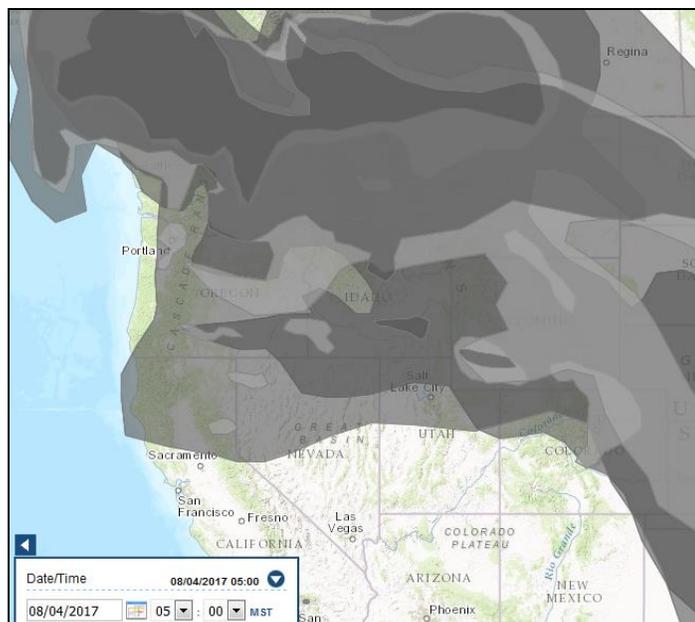


Air Quality Impact and Clear Causal Relationship

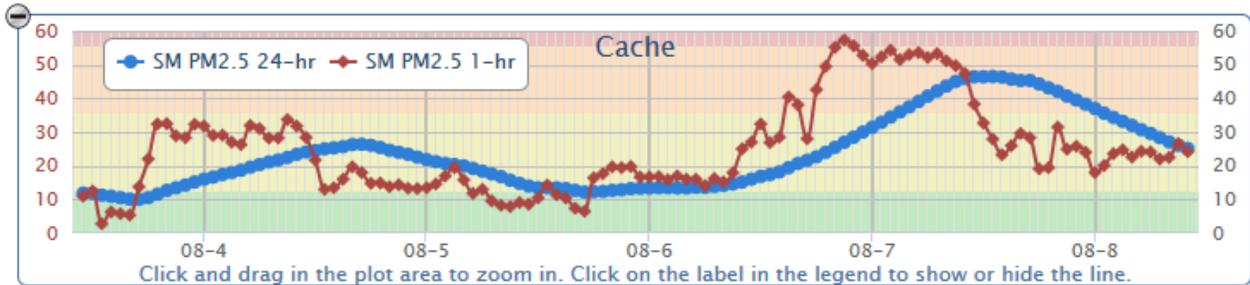
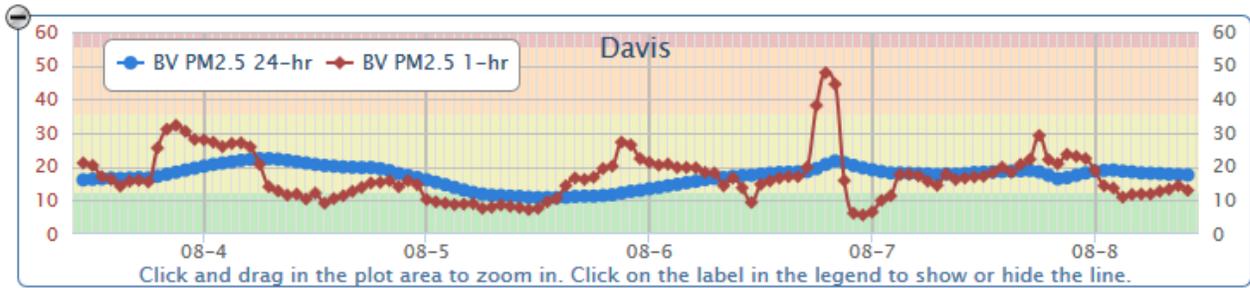
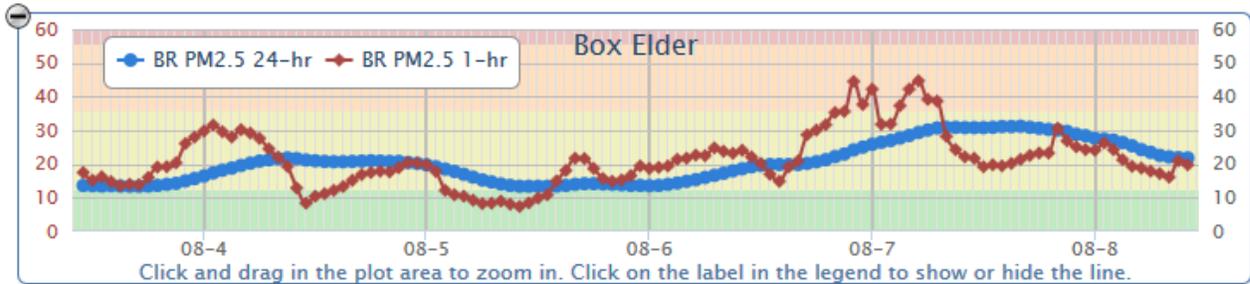
Wildfire smoke from western wildfires began to migrate into Utah around July 31, 2017. The EPA smoke map projection below is from August 1, 2017. By the first of August, smoke had penetrated into Northern Utah.



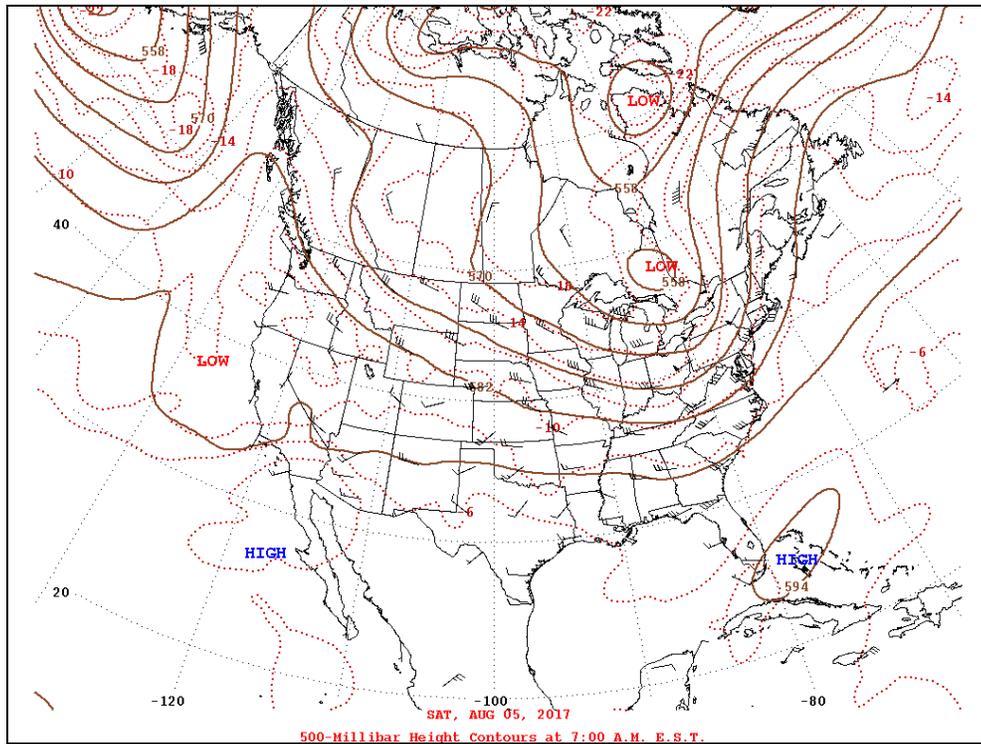
Smoke plumes intensified in Northern Utah by August 4, 2017.



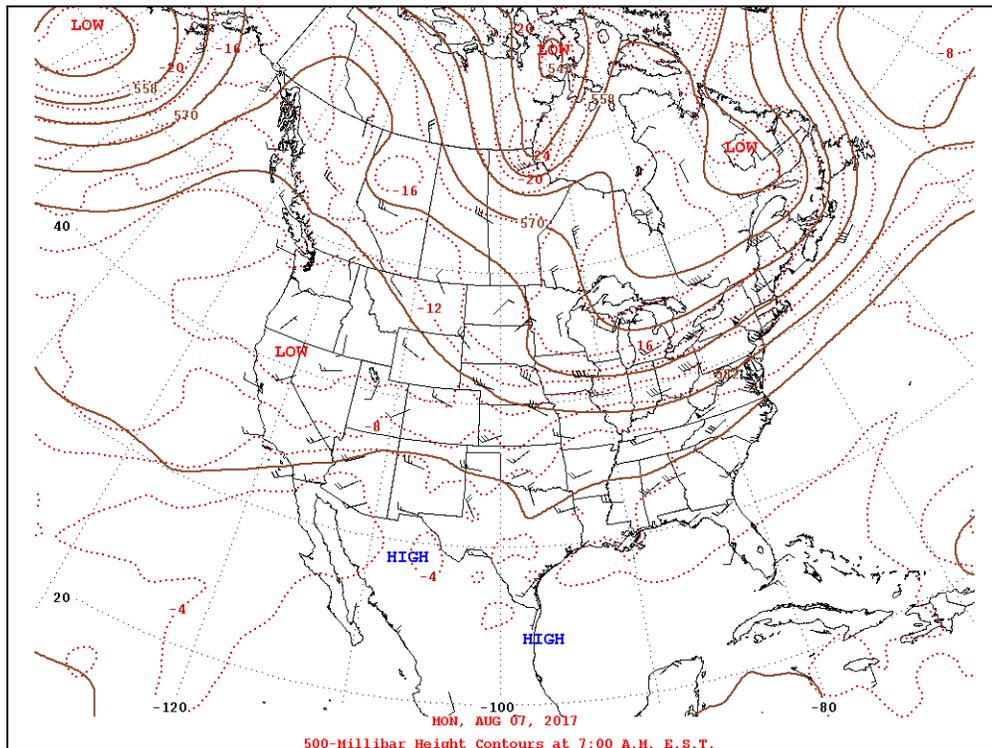
The PM_{2.5} trend chart for the three northern monitoring stations shows elevated PM_{2.5} levels corresponding with the smoke map projections starting August 3.



The 500 MB constant pressure map for August 5th shows stagnant conditions with a north westerly flow to the southeast due to a weak trough off the Canadian province. This caused smoke transport to Utah from California, Oregon and Idaho.

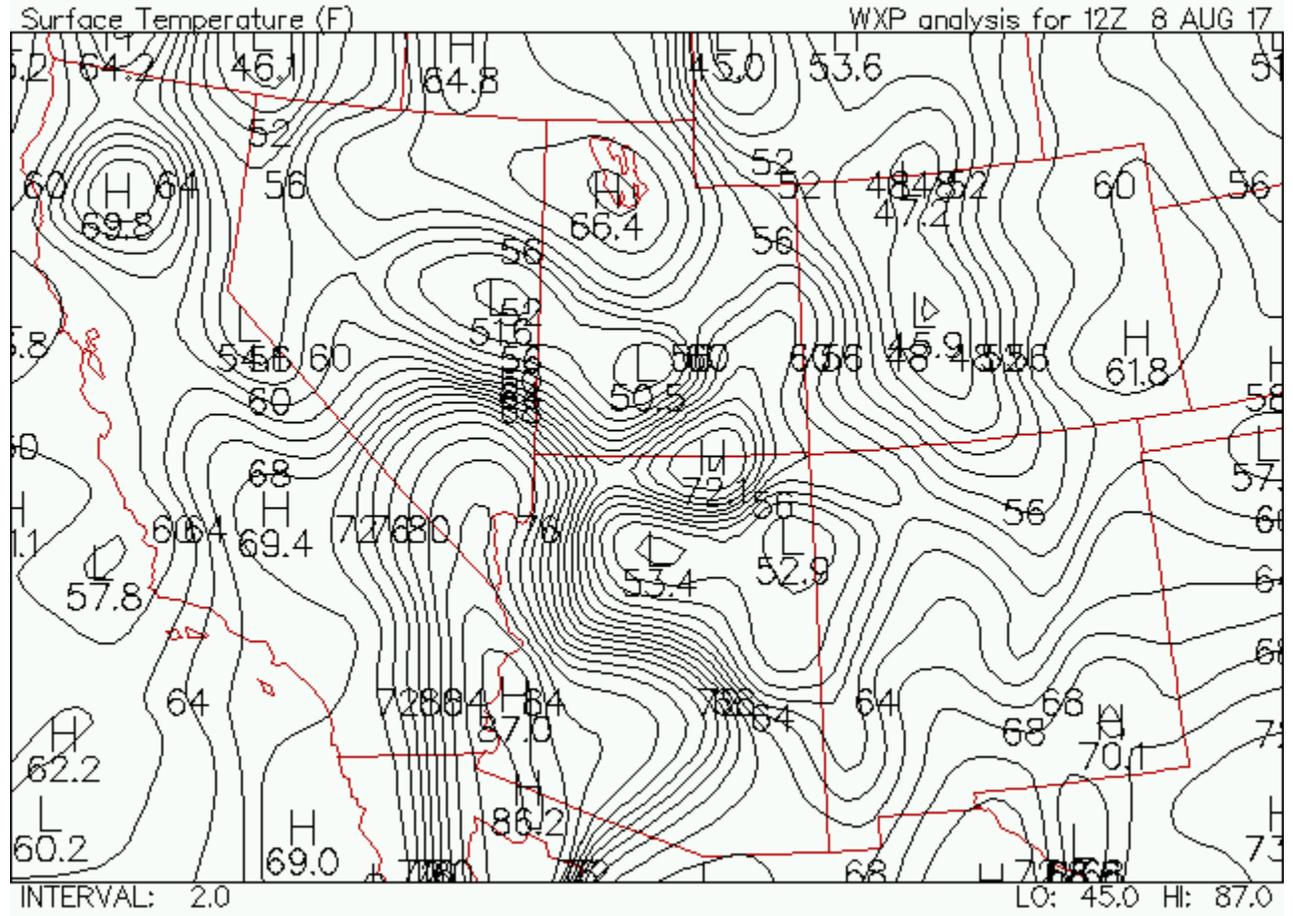


The trough weakened more on August 6th and the 7th, creating a stabilizing effect on the upper air mass that resulted in increased smoke plume stagnation.

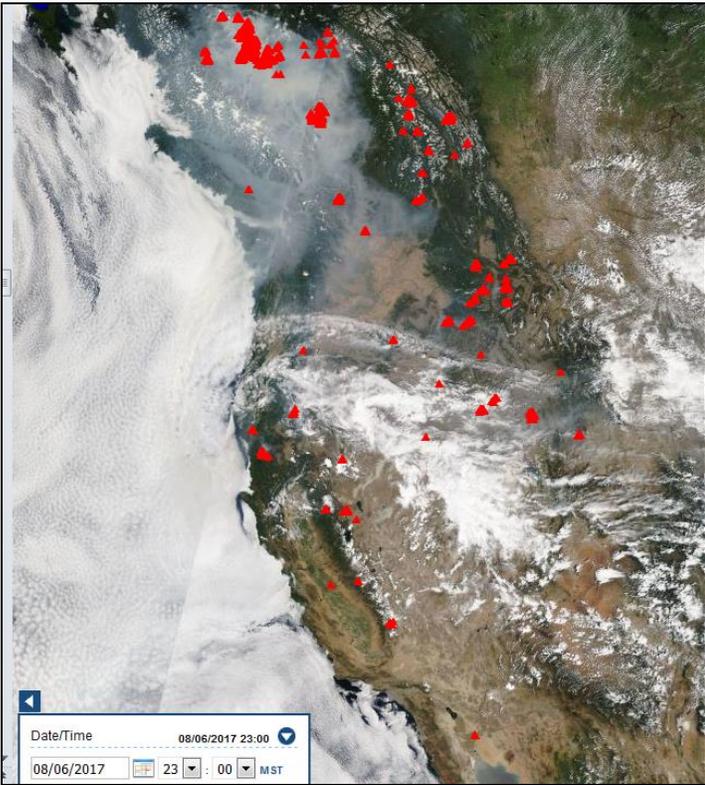
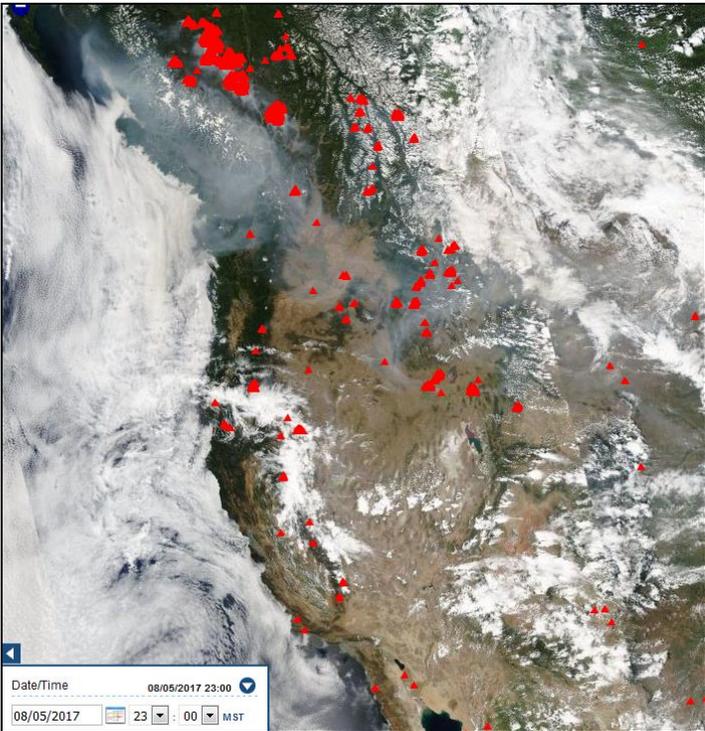


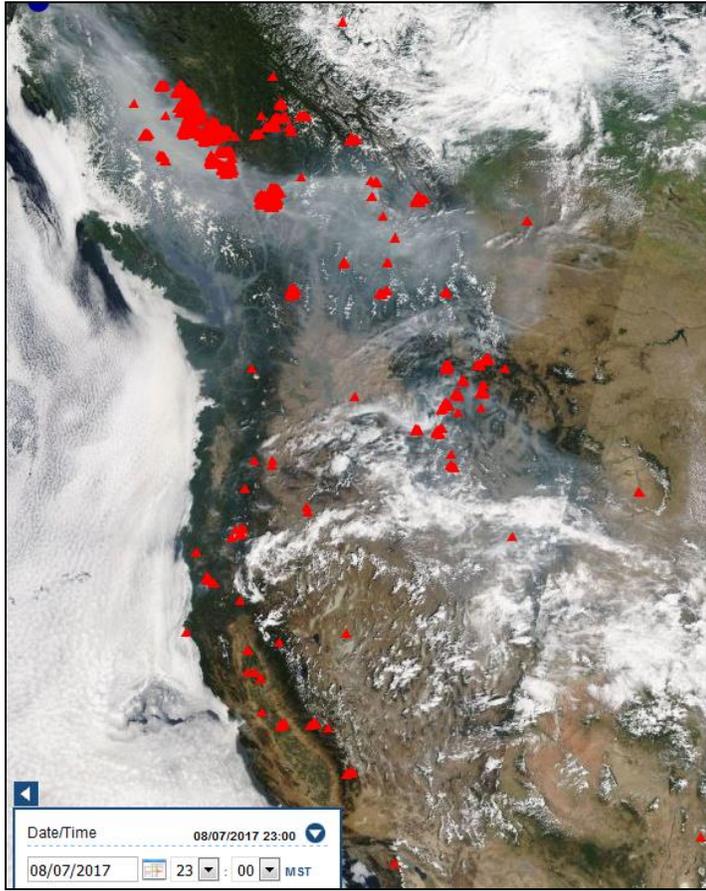
A high pressure system induced by monsoon flow drove the smoke plume further north on August 8.

▼ Plymouth State Weather Center ▼



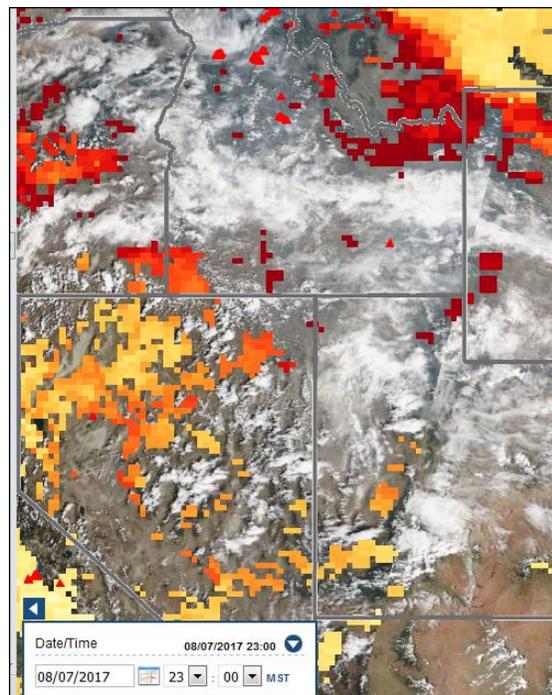
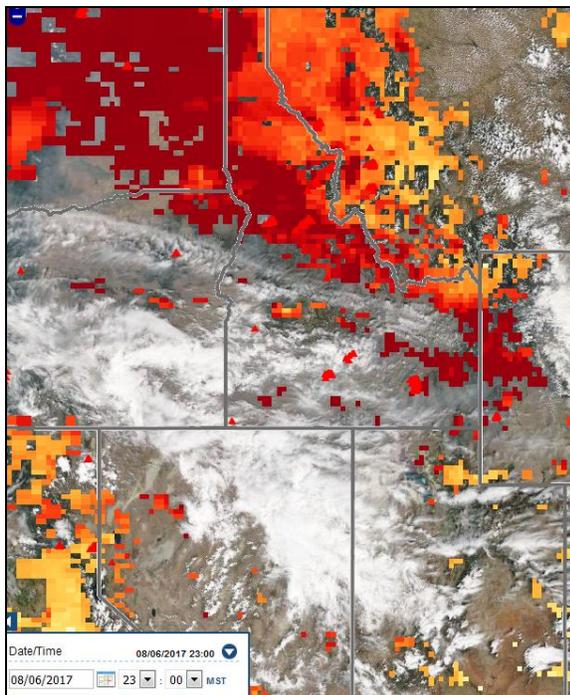
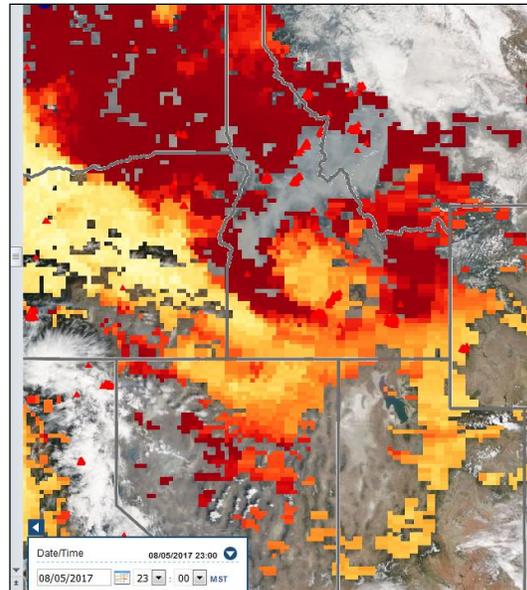
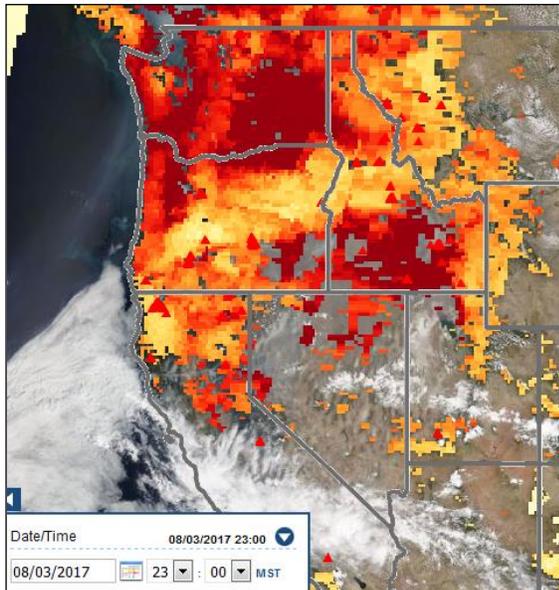
Smoke transport can be visibly verified with Modis satellite imagery. The red markers are the wildfire locations. The off-gray wisps are smoke plumes.





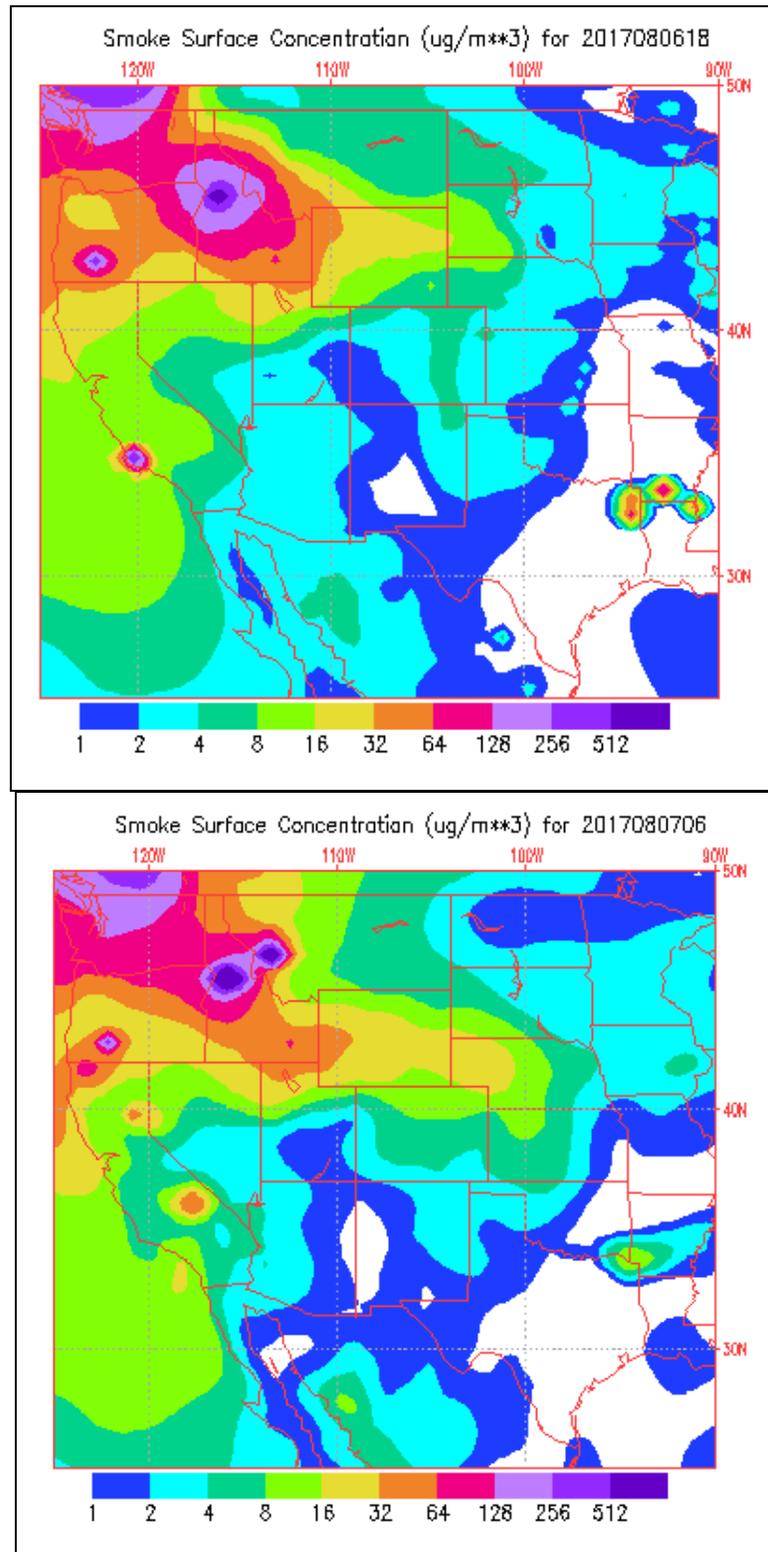
Aerosol optical depth (AOD) is the degree to which aerosols prevent the transmission of light. AOD measurements can provide supporting evidence for smoke plume migration. Smoke intensity is indicated by an increasing color scheme, with red as the maximum AOD.

These are a series of AOD overlays on the Modis satellite image starting on August 3, when visible smoke was evident in Northern Utah.

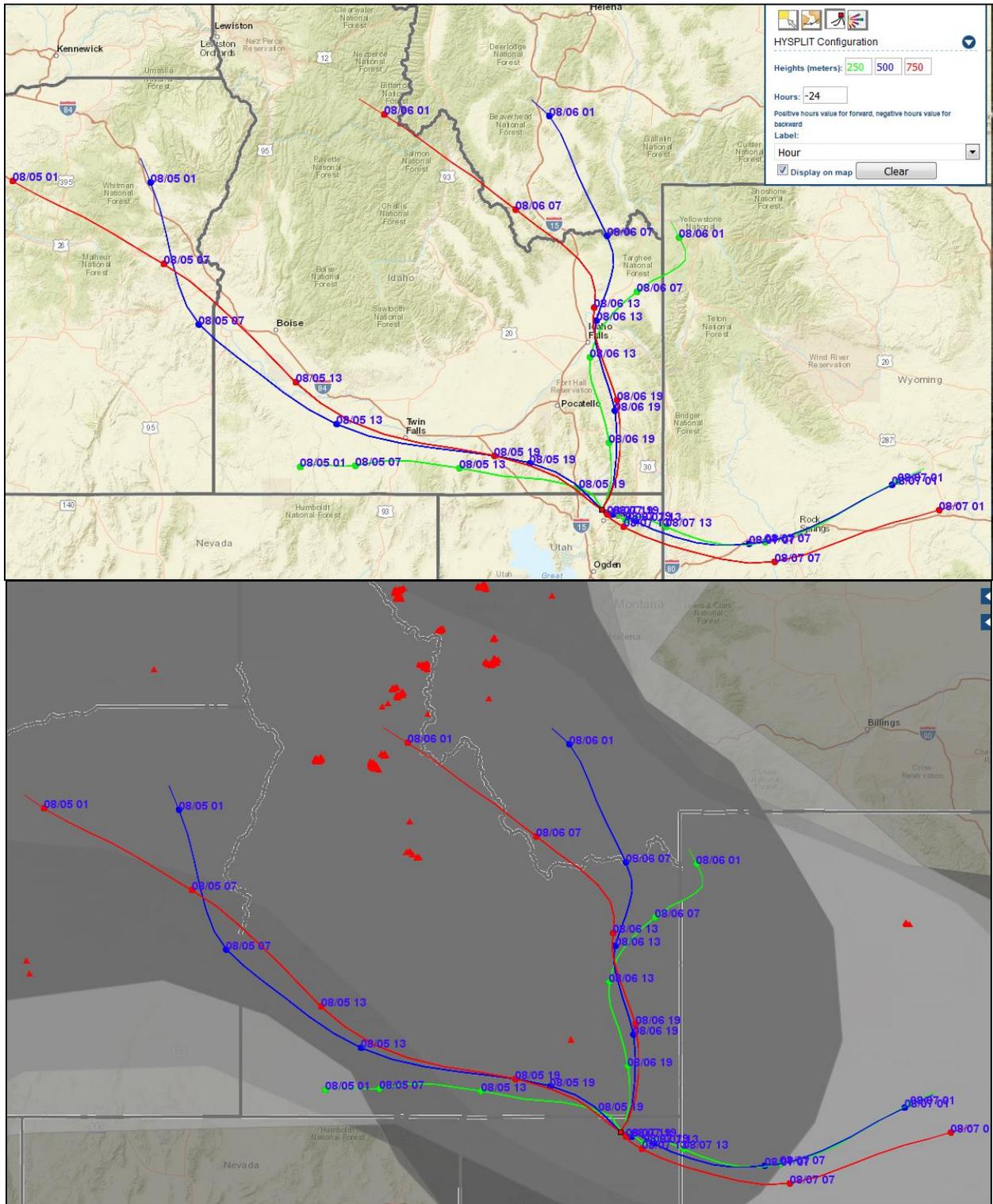


Wildfire hot spots are readily recognizable by the intensity of the red clustered areas. Varying degrees of AOD signal return is noted in Northern Utah (yellow to red). This signal return is consistent with downwind smoke.

The Naval Aerosol Analysis and Prediction System (NAAPS) provides an estimate of surface smoke concentration. NAAPS estimated that the surface concentrations were between 32 and 64 $\mu\text{g}/\text{m}^3$ on both August 6 and 7. The measured concentrations at the station were 40.6 $\mu\text{g}/\text{m}^3$ on August 6 and 39.6 $\mu\text{g}/\text{m}^3$ on August 7.

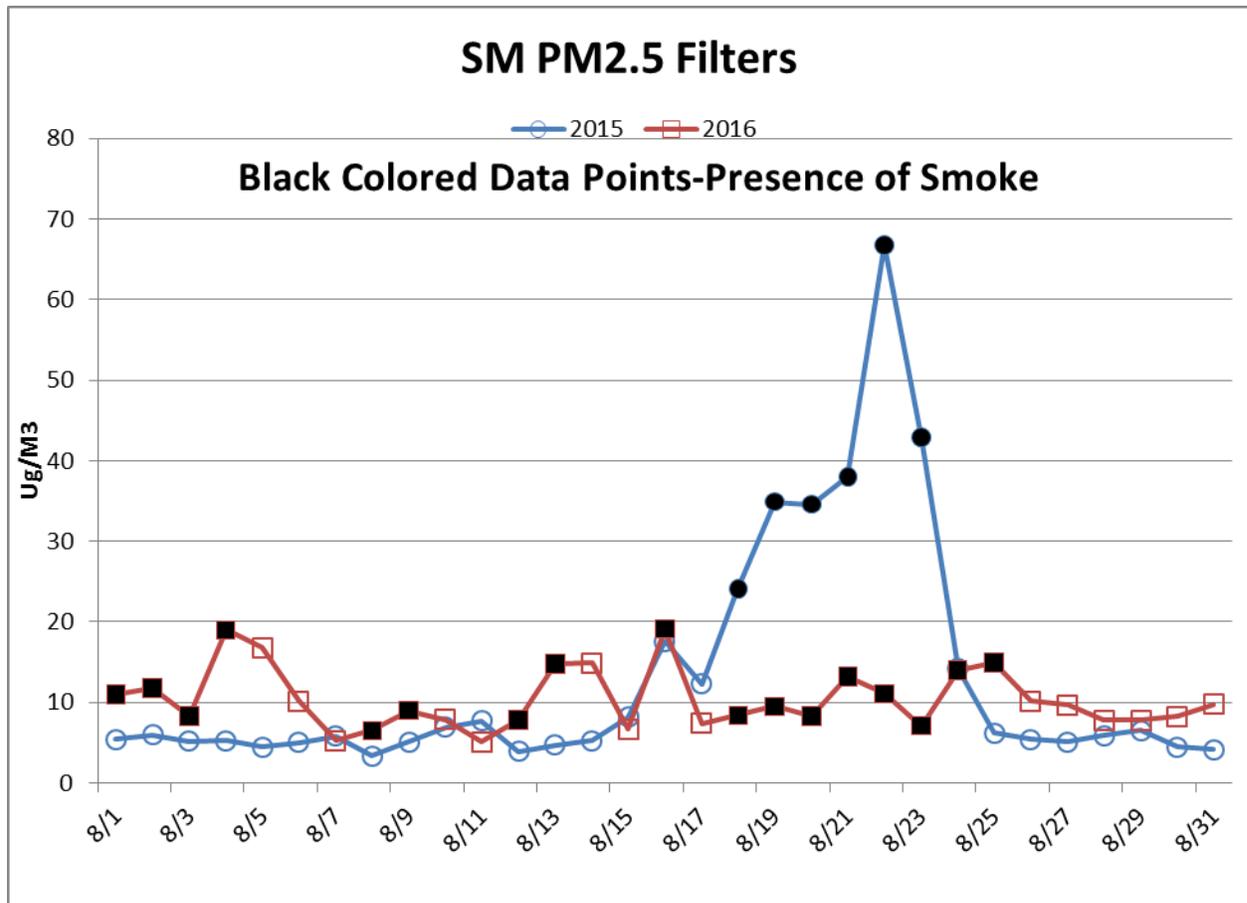


Hysplit back-trajectory 24-hour modeling from August 5-7, 2017 indicates that a varied or a mix of smoke plumes contributed to the PM_{2.5} exceedances. The upper figure depicts the back trajectories, while the lower figure shows an overlay of the back-trajectories on the smoke map.



Historical Data

The August 2015 and 2016 Smithfield filter data are plotted showing low PM_{2.5} values in the absence of wildfire smoke. The black colored data points indicate the presence of wildfire smoke.



Reasonable Controls

The Exceptional Events Rule requires that states have in place reasonable controls during exceptional events. The western wildfires were located outside of the State of Utah, beyond Utah control. None the less, the DAQ smoke management plan includes regulations that address open burning, prescribed burning, and wildfire management.

- R307-202. Emission Standards: General Burning. This rule regulates when general burning can be conducted under permits issued by local fire authorities. Open burning periods are established in different parts of the state when the atmosphere can safely disperse smoke and when wildfire hazard is low. This rule also prohibits the burning of certain materials.
- R307-204. Emission Standards: Smoke Management. This rule is designed to mitigate the impact on public health of prescribed fires and wildfires by establishing strict

requirements of land owners, state and federal agencies that conduct prescribed fires, and actions necessary by the wildfire coordinators during a wildfire event. The state smoke manager (a Bureau of Land Management employee) processes all prescribed fire requests prior to submitting those requests for DAQ director approval. He assures that prescribed fire plans contain a smoke mitigation plan and that the burn will comply with R307-204.

The Department of Natural Resources has fire management jurisdiction in unincorporated and forest lands through R652-120.

- R652-120. Wildland Fire. The State Forester enforces open burning of yard waste through a burn permit in unincorporated lands in the same manner as R307-202, which is designed for incorporated lands. This rule also deals with fire management and suppression and prescribed fire management.

Mitigation

1. News releases during the event advised citizens of the potential health impacts of smoke from the wildfires.
2. Web pages about emissions from wildfire are posted on the DEQ web site. They cover the health impacts of PM and actions a person could take to minimize exposure to PM.